

June 19, 1934.

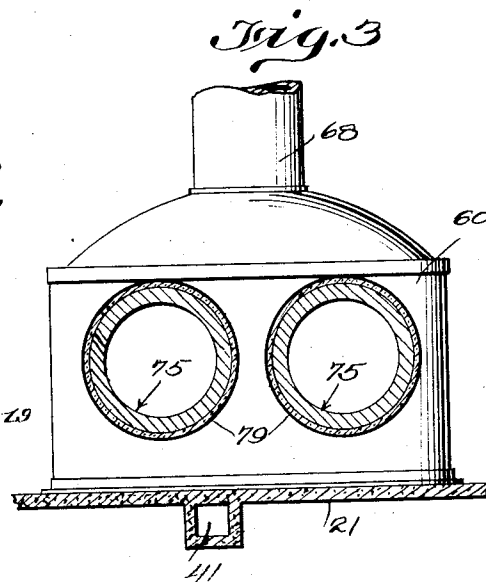
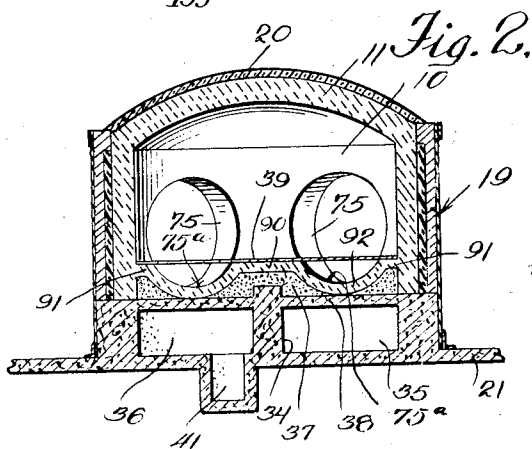
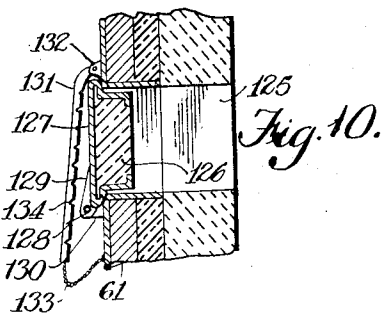
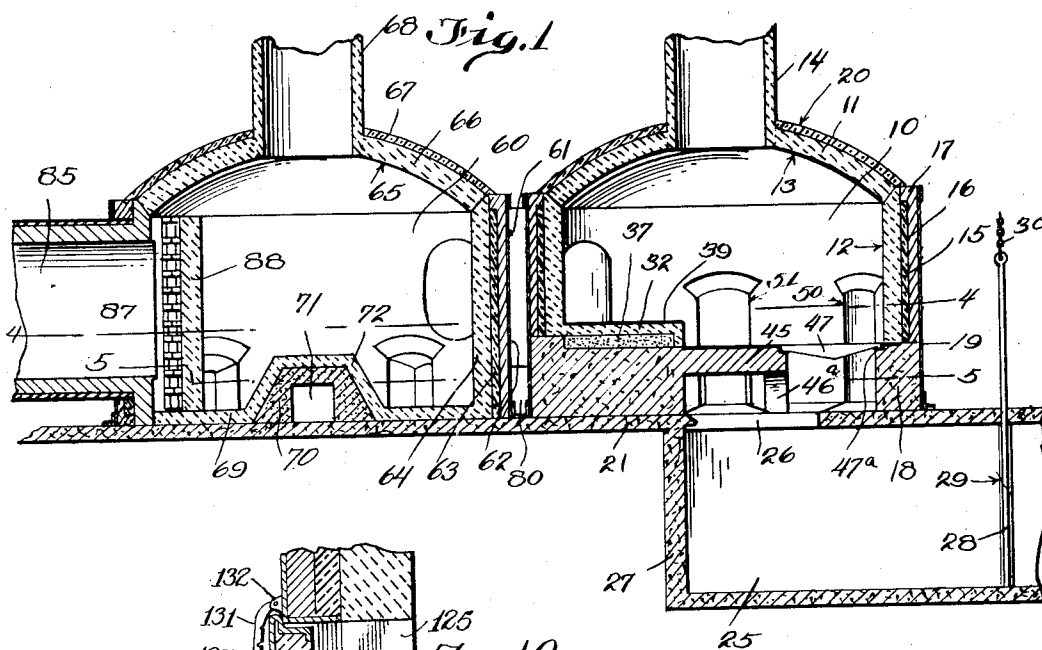
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1,963,574

INCINERATOR

Filed Sept. 30, 1930

3 Sheets-Sheet 1



WITNESS

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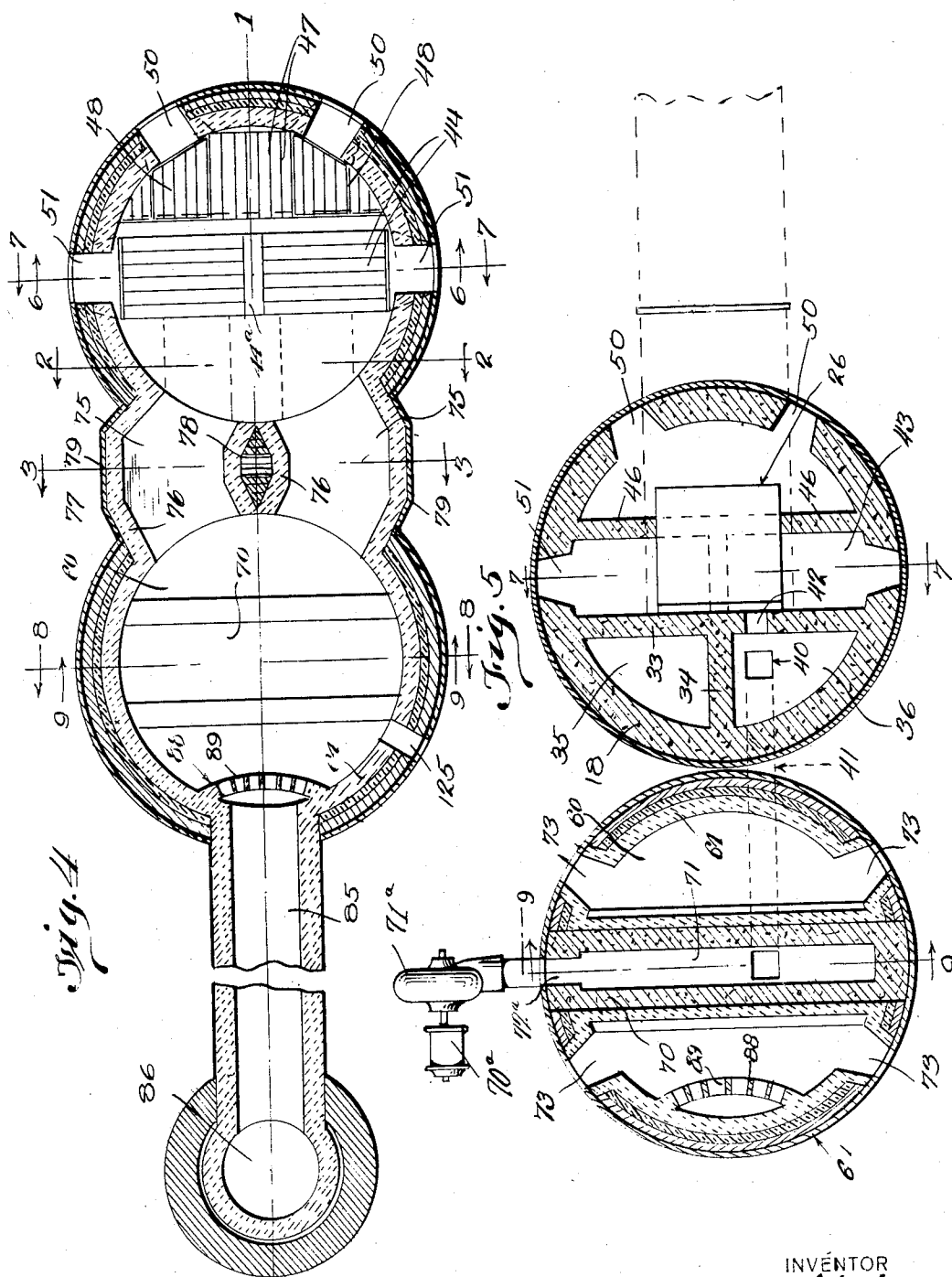
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INCINERATOR

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INCINERATOR

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Fig. 6

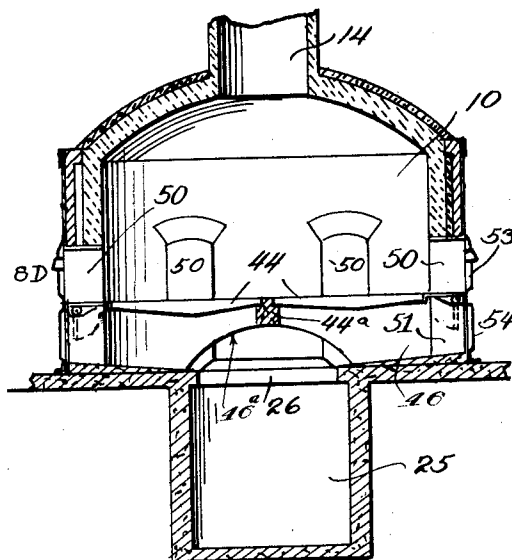


Fig. 7

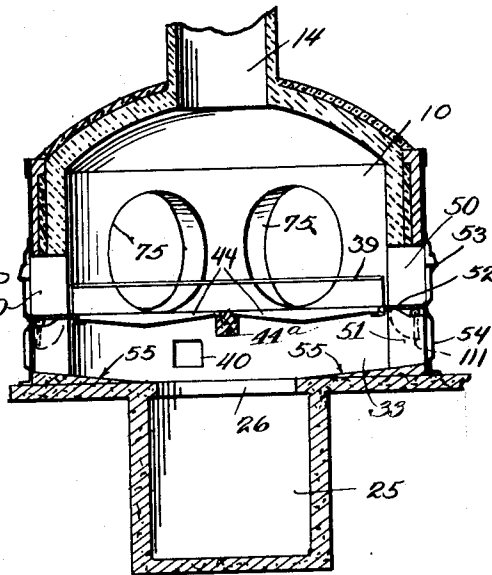


Fig. 8

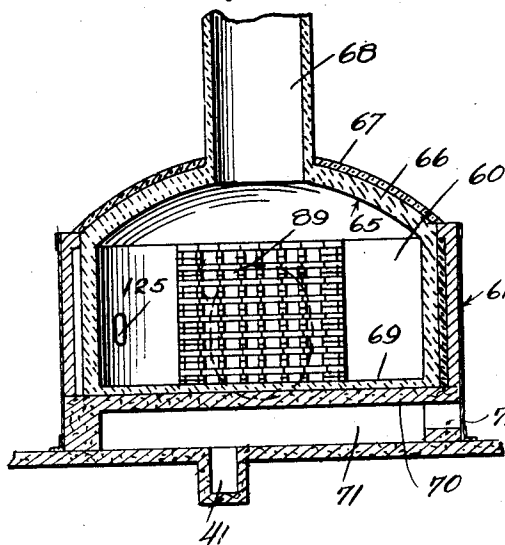
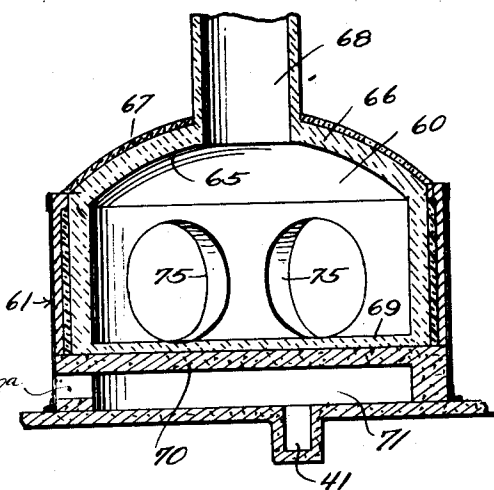


Fig. 9



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1,963,574

INCINERATOR

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Application September 30, 1930, Serial No. 485,523

11 Claims. (Cl. 110—8)

This invention relates to incinerators.

An object of the invention is to provide an incinerator so constructed that all its parts may be adapted and constructed to withstand for the longest possible time the heat, stresses, expansion and contraction to which they may be subjected.

Another object of the invention is to provide an incinerator which will burn materials most difficult to burn and so operate as to promote thorough combustion and the elimination of disagreeable odors.

Another object of the invention is to provide in an incinerator a circular furnace connected with a circular combustion chamber by two passages, which are likewise circular in cross section, and so located and bowed outward that they may be built of fire brick laid in a series of arches, whereby the arches at each end of such passages may be in line with the circular walls of the furnace and combustion chamber, the outside of the furnace, combustion chamber and passages being covered by a metal jacket, in such a way that the thrust from the arches over such chambers and passages and expansion and contraction are at all points compensated for, thereby preventing the destruction of the walls, the elements being so arranged as to provide air spaces communicating with the atmosphere between the furnace and combustion chamber and between such passages for the purpose of aiding in cooling the parts coming in direct contact with the greatest temperature.

Another object of the invention is the provision of a raised floor portion in the combustion chamber transverse to the line of passage of the gases through such combustion chamber, which serves the triple purpose of providing a hearth upon which material peculiarly difficult to incinerate may be burned, a space in which air may be preheated and thence fed under the fire in the furnace, and pits on each side of such raised portion in which ashes and other material drawn into the combustion chamber from the furnace are caught, and from which they may be easily removed.

A further object of the invention is the provision in an incinerator, consisting of a furnace and combustion chamber, with means for regulating the draft through such furnace, and at the same time, feeding fresh air into the combustion chamber to aid complete combustion, the draft regulating means comprising an airport in the wall of the combustion chamber and means for regulating the flow of air through such port, so that when air is admitted through such port the

static pressure in said combustion chamber will be reduced and the draft through the furnace correspondingly decreased, and at the same time, the air so admitted will aid in the complete combustion of gases in said combustion chamber by providing additional oxygen; such airport being so located that the air admitted will mix most effectively with the burning gases in said combustion chamber.

Still a further object of the invention is the provision of an incinerator including a combustion chamber and a furnace and an ash pit located below the furnace and provided with a closure to prevent the escape of air which may be forced under the grate of such furnace or when the furnace is not running on forced draft to prevent the entrance of air through such opening instead of through the preheating passages.

Another object of the invention is the provision in an incinerator furnace of a means of inducing a draft through the bottom of the pile of material which is being burned in such furnace and thus encouraging combustion in the middle of such pile, and at the same time, utilizing the heat from such combustion to aid in drying out the material to be burned, and consisting of a hearth occupying a portion of the transverse area at the back of the furnace and raised slightly above the level of the grates with the provision of passages through said hearth from the edge of the grate into the passages connecting the furnace with the combustion chamber and thence with the chimney.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawings forming a part of the specification; nevertheless, it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a longitudinal vertical section taken along the line 1—1 of Figure 4,

Figure 2 is a transverse vertical section taken along the line 2—2 of Figure 4,

Figure 3 is a transverse vertical section taken along the line 3—3 of Figure 4,

Figure 4 is a horizontal section taken along the line 4—4 of Figure 1,

Figure 5 is another horizontal section taken along the line 5—5 of Figure 1,

Figure 6 is a transverse vertical section taken

along the line 6—6 of Figure 4 and looking in the direction of the arrows,

Figure 7 is a transverse vertical section along the line 7—7 of Figure 5 and looking in the direction indicated by the arrows,

Figure 8 is a transverse vertical section of the combustion chamber taken along the line 8—3 of Figure 4 and looking in the direction indicated by the arrows,

Figure 9 is a transverse vertical section taken along the line 9—9 of Figure 5 and looking in the direction indicated by the arrows,

Figure 10 is a vertical section of an air damper employed in the combustion chamber.

Referring more particularly to the drawings, 10 designates a furnace having an inner lining 11 formed of fire-resistant bricks. It will be noted that the side walls 12 are circular and the top 13 is in the form of a dome. A cylindrically-shaped hopper or inlet 14 closed by a lid (not shown) is in communication with the furnace 10 through the dome-shaped top 11 and provides means for supplying the furnace with the materials which are to be burned.

The outer face of the liner 12 is covered with insulating material, as shown at 15, and an outer facing 16 of common brick embraces the insulating coating 15 with a portion of the brick, as shown at 17, extending over the top of the insulating material 15. The lining 12, the insulating covering 15 and the brick facing 16 rest upon a circular concrete wall 18. A steel jacket 19 covers not only the brick facing 16 but the wall 18. An insulating covering 20 is located on the outer face of the dome 13.

The wall 18 rests upon a concrete base member 21 which is of a thickness suitable for the purpose. This base member extends the entire length of the incinerator.

A pit 25 is located below an opening 26 in the base 21 and is of sufficient dimensions to receive a truck or other means of conveyance for the ashes which are produced in the furnace 10. The walls 27 of the pit are formed of concrete in any well known manner. The outer end of the pit through which the truck passes is provided with a movable closure 28 mounted within guides 29 formed in the side walls of the pit. A chain 30 is connected with the closure 28 for lifting the closure by mechanism (not shown) which forms no part of the present invention.

The rear portion of the furnace 10 is occupied by a hearth. This hearth is raised above the grates to be presently described is formed of fire-resistant materials, indicated at 32, and is supported by a concrete wall 33 extending transversely of the furnace and a short wall 34 extending longitudinally and connecting the wall 33 with the outer wall 18. Depressions are formed in the top of this hearth extending from the edge of the grates 44 into the flues 75 leading from the furnace. A metal plate 39, shown more particularly in Figures 1 and 2 is placed over the top of the hearth and over these depressions so that the depressions form passages, more clearly shown in Figure 2 and by the dotted lines in Figure 4, through the hearth from the edge of the grate into the flues leading from the furnace.

It is obvious that in operation the draft from the furnace to the chimney will induce a draft through these passages and when the material to be burned is piled on the grates and hearth this draft will tend to induce a draft through the bottom central portion of such pile and will encourage

combustion at that point. Furthermore the products of such combustion as they pass under the metal plate which forms the top of the hearth they will tend to heat the material resting on such hearth.

The grates 44 are located forwardly of the hearth. A series of grates 47 and 48 extend longitudinally and forwardly of the grates 44. It is on the grates 44, 47 and 48 that the combustion of materials is initiated. The grates 44, 47 and 48 are supported by the walls of the furnace, transverse walls 33, 46 and a beam 44^a. The outer ends of the grates 47 and 48 rest in grooves 47^a formed in the wall 18. A pair of stoking openings 50 are formed in the side wall of the furnace 10 and adjacent the grates 48, and at the forward end of the incinerator. A pair of stoking openings 51 are located at diametrically opposite points and at the opposite ends of the grates 44. A door 53 is adapted to normally close the upper section of the stoking openings 50 and 51 which align with portions of the furnace above the grates. Cleanout doors 54 close the lower sections of the openings and are located in the outer ends of the passages 50 and 51 and permit the removal of refuse or ashes which have fallen on the inclined surfaces 55 of the floor of the furnace. A dumping section 52 disposed at the bottom of each passage 50 is provided for discharging into the cleanout passages 51 incombustible materials or clinkers which may collect on the grate. A lever 111 is connected with each dumping section for moving said section to its open or closed position.

A combustion chamber 60 is located adjacent the furnace 10. This combustion chamber is formed of an outer metal sheath or covering 61 which has a backing of common brick, indicated at 62. An insulating material 63 is located between the walls 62 and a liner 64 formed of fire-resistant material 66 and an insulating coating 67 is secured to the outer face of the material 66. A cylindrical opening 68 closed by a lid (not shown) allows access to the chamber 60 from the top and is likewise formed of fire-resistant material. The bottom of the chamber is formed of fire-resistant material indicated at 69 and rests upon the base 21.

Located centrally of the chamber 60 and transversely of the longitudinal axis of the chambers 10 and 60, is a raised portion 70 formed of concrete and provided with a longitudinal passage 71. The fire-resistant material, as shown at 72, is disposed over the raised concrete 70. A port 72^a is formed in the wall of the combustion chamber and is in communication with the passage 71. It will be noted that the passage 71 is in communication with the air duct 41. A blower 71^a driven by a motor 70^a may be connected with the passage 71 for forcing air through said passage where it becomes heated and thence through the conduit 41, and through the openings 40 and 42 and thence under the grates in the furnace.

Upon opposite sides of the raised portion 70 are provided doors 73 connecting the chamber 60 with the atmosphere. These passages form a means of egress to the chamber and are closed by doors to be presently described.

The combustion chamber is connected with the furnace 10 by the two conduits 75. These conduits are circular in cross-section and are bowed outward from each other, as is more particularly shown in Figure 4. The linings 76 are made of fire-brick. This lining of fire-brick is covered by a layer of insulating material, which in turn is covered by a steel jacket 79, which forms an

integral part of the jacket around the furnace and combustion chamber. This jacket and the walls of the furnace and combustion chamber support all weight and carry all thrust from the brick work in these conduits. These steel jackets need not exactly conform to the curvature of the brick work in the conduits but may be made in sections for greater ease of fabrication, the irregularities being filled by the insulating material. The outer portion of these conduits allows a space 78 between them which is in communication with the atmosphere and assists in cooling them and the piers between them which support the furnace and combustion chamber. It will also be noted that the outer walls of the conduits 75 are raised above the base 25 to provide an air space 80, as shown in Figure 1. It will also be observed that as the gases enter the combustion chamber through these conduits the currents from the two conduits converge which will tend to promote a thorough mixing and complete combustion of the gases.

A horizontally disposed flue 85 connects the chamber 60 with the stack 86 which is disposed in a vertical manner. Embracing the openings 87 between the conduit 85 and the chamber 60 is a baffle 88. This baffle is formed of fire-resistant bricks and the passages 89 are formed in the baffle to permit the passage of smoke and combustion gases.

Referring more particularly to Figure 4 it will be seen that this baffle is built curved inward toward the combustion chamber. This enables it to better stand the pressure of the gases against it. Such pressure tends to press the parts more closely together rather than push it apart as it would if the baffle were straight. Also this curved construction better enables it to withstand expansion and contraction.

The passage 125 formed in the walls of the combustion chamber 60, as shown in Figures 4 and 8, provides means for admitting air in varying quantities to the combustion chamber for aiding in regulating the draft to the flue 85. A cap or closure 126 is formed of metal and the interior of the cap as shown at 127 is filled with insulating material. This cap is pivoted at 128 by means of arms 129 connected to the cap and an arm 130 connected with the metal sheathing 61 on the outer face of the combustion chamber 60.

It will be seen that the cap 126 swings outwardly and is maintained at predetermined angles and in variable closing positions with the passages 125 by means of an arm 131 pivoted at 132 on the metal facing 61. This arm is limited in its outward movement by means of a chain 133 connected with the free end of the arm while the other end of the arm is connected to the metal facing. This arm is provided with notches 134 which are adapted to be engaged by the upper free end of the cap 126. The amount of air passing through the port 125 will be regulated by the position of the cap which is controlled by the angle of the arm 131.

In the operation of the device all matter that is to be burned is fed into the furnace 10 where the same is ignited. The hearth represented by the plate 39 is raised above the level of the grates. When the material has been applied to the hearth and the grates and ignited the passage under the top of the hearth will aid in inducing a draft through the body of the burning material and encourage combustion to take place in the center of the bottom of the pile as well as around the

edge and on top of the piled material in the furnace 10.

As the gases pass from the furnace to the combustion chamber the combustion is completed and when desirable, debris or dead animals may be placed on the fire brick 72 of the raised portion in the combustion chamber 60 where the flames are most intense. The spaces on opposite sides of the raised portion will provide channels to collect ashes or other products of combustion and these matters may be removed through clean-out doors or passages 73 formed in the side walls of the combustion chamber. It will be appreciated, however, that the raised portion is employed as a hearth for burning such materials which are difficult to incinerate and for heating air forced to the furnace by the blower 71^a.

In order to prevent the burning material from being drawn by the draft into the stack 86 the perforated baffle 88 is located at the front end of the horizontally disposed flue. This baffle is not only curved inwardly towards the combustion chamber but the fire bricks are laid in honeycomb fashion. This rounded construction allows for expansion while the draft tends to press the parts close together rather than pushing them outwardly if the baffles were formed of a straight wall.

The gate or slidably mounted door 29 at the open end of the ash pit 25 closes the open end in order to prevent the draft from escaping through the ash pit instead of moving along a directed path to the vertically disposed stack 86.

The gases pass from the furnace through the conduits 75 into the combustion chamber where they are mixed and combustion is completed. It will be observed that the curved conduits converging as they enter the combustion chamber will tend to promote a thorough mixing of the combustible gases. The burning gases will pass over the raised portion 72 in the combustion chamber and will tend to heat it and to consume any material that may be placed upon it through the hopper 68 in the top of the combustion chamber, and will pass thence through the baffle 88, the flue 85 and thence out of the chimney 86.

The spaces on opposite sides of the raised portion in the combustion chamber will collect ashes and other products of combustion that may be carried into the combustion chamber and will prevent their being carried into the flue 85 or out of the chimney 86. The baffle 88 also will tend to stop such material, particularly burning papers and similar material. Air may be forced through the opening 71 in the raised portion 72 and where it will become heated and thence through the passages 41—40—42 into the bottom portion of the furnace, and thence through the grate to aid in more rapid combustion. The draft through these passages may be induced by the blower 71^a connected to the outer end of the passage, or may be induced by the draft from the chimney without the use of a blower. In either event, the door 28 across the opening to the ash pit will prevent the air from passing in or out there and thus interfering with the action just described.

I claim:

1. An incinerator comprising a circular furnace, a circular combustion chamber which is formed as a unit and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, the combustion chamber

having a raised portion on the bottom thereof, the raised portion being provided with an air chamber in communication with the atmosphere, and an air conduit connecting the furnace with the air chamber, the furnace having a grate section which is at a higher level than the floor of the combustion chamber, the raised portion being disposed transversely of the path of the combustion gases from the furnace through the combustion chamber and being adapted to act as a support for material to be consumed, clean-out means, and charging means being provided for the combustion chamber.

2. An incinerator comprising a furnace, a combustion chamber which is formed as a unit and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, a hearth in the furnace having an air chamber embodied therein, the combustion chamber having an air chamber in the bottom portion thereof, a conduit connecting the air chamber of the hearth with the air chamber of the combustion chamber, means for placing the air chamber of the combustion chamber in communication with the atmosphere, the top wall of the air chamber of the combustion chamber being raised above the bottom portion and extending transversely of the path of combustion gases from the furnace and being adapted to act as a support for materials to be consumed, clean-out means, and charging means being provided for the combustion chamber.

3. An incinerator comprising a furnace, a combustion chamber which is formed as a unit and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, a hearth in the furnace having an air chamber embodied therein, the combustion chamber having an air chamber in the bottom portion thereof, a conduit connecting the air chamber of the hearth with the air chamber of the combustion chamber, grates located adjacent the hearth, means placing the air chamber of the hearth in communication with the furnace at a point below the grate, the air chamber of the combustion chamber having a top wall acting as a support for materials to be consumed and extending transversely of the path of the combustion gases through the combustion chamber, clean-out means, charging means provided for the combustion chamber, and means for placing the air chamber of the combustion chamber in communication with the atmosphere.

4. An incinerator comprising a furnace, a combustion chamber which is formed as a unit and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, a hearth in the furnace having an air chamber embodied therein, the combustion chamber having an air chamber in the bottom portion thereof, a conduit connecting the air chamber of the hearth with the air chamber of the combustion chamber, means placing the air chamber of the hearth in communication with the furnace, means for placing the air chamber of the combustion chamber in communication with the atmosphere, the air chamber of the combustion chamber having a top wall located above the bottom portion of the combustion chamber and extending transversely of the path of the combustion gases passing through the chamber, clean-out means, and charging means for the combustion chamber.

5. An incinerator comprising a furnace, a combustion chamber which is formed as a separate unit from and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, a hearth in the furnace having an air chamber embodied therein, the combustion chamber having a diametrically extending raised hollow portion forming an air chamber which extends transversely of the path of combustion gases through the combustion chamber, a conduit connecting the air chamber of the hearth with the air chamber of the combustion chamber, grates located adjacent the hearth, means placing the air chamber of the hearth in communication with the furnace at a point below the grate, means connecting the air chamber of the combustion chamber with the atmosphere, clean-out means, and charging means for the combustion chamber.

6. An incinerator comprising a furnace, a combustion chamber which is formed as a unit separate from and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, a floor in the furnace provided with an opening, grates in the furnace located above the floor, an ash pit disposed below the opening and having one end open to the atmosphere, means for closing the open end of the pit to prevent a draft from the furnace to the pit, a hollow raised portion in the combustion chamber acting as a support for materials to be consumed and extending transversely of the path of combustion gases through the combustion chamber, means for connecting the hollow raised portion with the furnace at a point which is below the grates, and means for forcing air through said hollow portion and connection to provide preheated air for combustion in said furnace.

7. In an incinerator comprising a furnace, a combustion chamber which is formed as a unit separate from and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, the combustion chamber having a raised portion on the bottom thereof, the raised portion being provided with an air chamber in communication with the atmosphere, the top wall of the raised portion acting as a support for materials to be consumed, said raised portion extending transversely of the path of combustion gases through the chamber, a baffle in the combustion chamber provided with a plurality of openings and embracing the communication between the combustion chamber and the stack, and means for placing the air chamber in the raised portion in communication with the furnace for supplying heated air to the furnace.

8. An incinerator comprising a furnace, a combustion chamber which is formed as a unit separate from and independently of the furnace, a conduit connecting the furnace with the combustion chamber, a stack connected with the combustion chamber, the combustion chamber having a raised portion on the bottom thereof, the raised portion being provided with an air chamber in communication with the atmosphere, the top wall of the raised portion acting as a support for materials to be consumed, said raised portion extending transversely of the path of combustion gases through the chamber, a baffle in the combustion chamber provided with a plurality of openings and embracing the communication be-

tween the combustion chamber and the stack, the baffle being curved inwardly towards the combustion chamber, and means for placing the air chamber in the raised portion in communication with the furnace for supplying heated air to said furnace.

to the atmosphere, the bowing outwardly of the conduits providing for close association of the ends of the conduits where they are connected with the combustion chamber and with the furnace, for causing the combustion gases to converge at a point centrally of the combustion chamber and immediately above the material supporting hearth therein for creating mixing of the gases and for concentrating the combustion at the said point, and a metal covering surrounding the furnace, combustion chamber and conduits.

9. In an incinerator, a furnace, a combustion chamber, conduits connecting the furnace and combustion chamber for conducting combustion gases from the furnace to the combustion chamber, a raised portion of the floor of the combustion chamber located transversely to the line of passage of the gases through such combustion chamber and below the level of said conduits, said raised portion adapted to support material to be consumed, an opening in the roof of the combustion chamber above said raised portion and doors in the walls of the combustion chamber, the doors being located at the sides of the ends of such raised portion, the raised portion having a passage connected with the atmosphere at one end and connected by passageways with the space in the furnace below the grates at the other end, the conduits converging toward each other where they enter the combustion chamber for causing the combustion gases to converge at a point immediately above the raised portion and centrally of the combustion chamber, thereby creating a mixture of said gases and concentrating the combustion at said point.

11. An incinerator including a circular furnace and a circular combustion chamber, the combustion chamber being formed independently of and exteriorly of the furnace and containing a material-supporting hearth, conduits connecting the combustion chamber with the furnace, said conduits being bowed outwardly from each other to provide a passageway between said conduits open to the atmosphere, the bowing out of the conduits providing for the close association of said conduits where they connect with the combustion chamber and the furnace, the bowing out of the conduits causing the ends of the conduits to be connected at substantially right angles to the walls of the combustion chamber, the bowing of the conduits where said conduits enter the combustion chamber causing the combustion gases discharged from said conduits to converge at a point centrally of the combustion chamber and immediately above the hearth therein for creating a mixing of the gases and for concentrating the combustion at said point, and a metal covering surrounding the furnace, combustion chamber and conduits.

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